As of 12.17.09

Proposed Urban Loop Prioritization Process

The North Carolina Department of Transportation (Department) proposed an urban loop prioritization process and posted it on its website for public comment until Nov. 30, 2009. Comments have been received and reviewed. An accompanying 27-page power-point presentation contains a summary of the comments received and the Department's response to those comments. As a result, the Department is proposing changes to the proposed criteria. The most significant changes are these:

1. The Infrastructure Health factor was deleted. Several comments indicated that the "needs" of a new loop are not dependent on the pavement condition of parallel routes. Probably true. Since the factor was only 4% of the overall scoring, it was deleted.

2. The Environmental Readiness Factor was deleted. Several comments indicated this factor did not really provide any "benefit" to the project. The Department has decided to not use this factor in the scoring but consider it under the "Other considerations".

3. The Air Quality Conformity factor was deleted. Several comments indicated there was some confusion over the scoring. Also, projects in attainment areas were not addressed. The Department has decided not to use this factor in the scoring but consider it under the "Other considerations".

4. The Land Use factor was deleted and replaced with a factor titled "Protected right of way". There seemed to be a consensus that every urban area has likely done some form of land use to address the urban loops in their area. Several comments were received that protecting the right of way was a better measure. Thus, a new factor titled "Protected right of way" has been added. See below and the Appendix for details of the scoring for this factor.

5. A new factor titled "Non-Loop Funding" was added. Several comments were received that the process needs to reward urban loop projects that are supported financially by local governments or users. The Department fully agrees. There is a constraint however in the General Statues. G.S. 136-66 and GS. 143B-350 place restrictions on giving an advantage to any project using local government participation. Thus, the Department is proposing a criteria that should help meet the desires of the comments and the Department yet stays within the context of the General Statues. See below and the Appendix for details of the scoring for this factor.

6. A simpler scoring system has been developed. To simplify an understanding of the scoring system, the Department has revised the scoring to allow each "needs" factor and "benefits" factor to have a potential point total of 0 to 100. Each factor will then be weighted by some percentage of the overall scoring. In other words, the maximum number of points that can be assigned for congestion, safety or infrastructure health or the six benefit factors (travel time savings, economic development, freight mobility, multi-modal, protected right-of-way, and non-loop funding) is 100 points each but the

weighting factor for each can be changed to reflect how important that factor is in relationship to all other factors and obviously the sum total of the percentages of all the factors must equal 100%.

To help ensure these criteria receive full disclosure before the process is finalized. the Department is going to solicit comments again. These criteria have been revised, reworked and new criteria proposed based on the attached comments we received. *We will appreciate receiving comments on whether these are the appropriate criteria and weighting factors by February 28, 2010*.

The expected timeframe of remaining work after the comment period closes is to review, revise and finalize urban loop criteria in March. Work with MPO staff to review data inputs to the model and have model runs completed in April.

One other note, several comments were received requesting that the MPOs be given the opportunity to review the data inputs prior to scoring the projects. The Department agrees to do this but the first step is to ensure everyone has had the opportunity to comment on the criteria to be used. Once the ranking criteria and scoring system is finalized, the data inputs will be more fully developed and shared with MPO staff for their review and comment before the final results are tabulated.

Objective
Create an Urban Loop prioritization process that supports statewide growth, economic development and enhances mobility.

Background
The Urban Loops program designation and funding was established by the 1989 Highway Trust Fund as part of the Intrastate Highway System. The Trust Fund legislation stated the Intrastate System was "designed to support statewide growth and development objectives and to connect to major highways of adjoining states." There were 7 loops established at that time (Asheville, Charlotte, Winston-Salem, Greensboro, Durham, Raleigh and Wilmington). Three additional loops were later added: Fayetteville and Greenville in 2003 and Gastonia in 2004.

Furthermore, G.S. 136-180 states that a new Interstate or freeway as the revised termini of an urban loop may be accepted if "The Board of Transportation finds that the purposes of the urban loop facility, specifically including reduced congestion and high-speed, safe, regional through-travel service, would be enhanced by the action."

The Urban Loop Program currently totals 353 miles, 140 of which are open to traffic. The estimated cost to complete the program is now around $5.5 Billion. At the current funding rate and the expected increases in construction costs, it will take more than 50 years to complete the program. The challenges in constructing these projects have been many and can be expected to grow in difficulty. Urban loop projects are new location projects that are large, complex and costly and can be very time-consuming to move through the project development process. Ever rising costs of engineering, right-of-way,

construction and environmental impacts ensure that further delays in completing the Urban Loop program translate to additional funding needs. Economic development opportunities are lost when the urban loops are not completed. At the same time, revenues to the Department have declined. A prioritization process to help ensure the most cost-effective use of resources to complete the urban loop program is needed.

The 21st Century Transportation Committee report dated December 2008 included the following "policy objective": "Enhance mobility and reduce congestion by accelerated investment and completion of all planned urban loops with priorities established based on measurable transparent criteria."

Purpose
The purpose of the loop prioritization process is to prioritize the remaining TIP projects that comprise the uncompleted sections of the 10 Loops.

Proposed Principles of an Urban Loop Prioritization Process
The following principles outline what an urban loop process should achieve. When the priorities are established, one should be able to say the priorities meet the test of following principles:

- Projects will support statewide growth and foster economic development
- Selection criteria will be data driven and transparent
- Selection criteria will be consistent with overall Strategic Prioritization Process
- Pilot effort will include a Benefit-Cost Type Methodology
- Pilot effort will be subject to public review and comment
- Secretary of NCDOT will have ability to move projects in final rankings

Proposed Methodology
A urban loop prioritization process would include both "needs" and "benefits" factors. This is based on research of various State's highway prioritization processes. The most mature State prioritization processes have some form of a "benefit-cost" methodology that provides project rankings based on identifying not just the needs for projects but also incorporating the benefits and costs of the projects to meet those needs. Proposed "needs" factors and "benefits" factors are outlined below:

The Strategic Planning Office of Transportation (SPOT) highway prioritization model is currently a needs-based only approach to prioritizing TIP projects but is limited to analyzing current conditions not future conditions. Therefore, the SPOT highway prioritization model is a starting point for establishing priorities for planned urban loops. Since urban loops are Mobility projects on the Statewide Tier, it is appropriate to use the highway prioritization matrix for scoring needs. This also shows consistency with one of the guiding principles. These "needs factors" are briefly described below but the details of the scoring for each factor are more fully explained in the Appendix. Also attached is a scoring sheet which provides the weighting factors in a table format.

"Needs" factors
The data for the "needs" factor will be taken from the parallel routes to the proposed urban loop project. Parallel routes are defined as those routes currently carrying the traffic that is expected to use the new urban loop. The Department agrees to work with MPO staff to ensure agreement on which routes are considered "parallel routes". The data will be the most current data available in NCDOT databases and the Department will ensure the same year's data be used for all 10 urban areas. More details on these factors are included in the Appendix.
1. Congestion Score (10%): A measure of recurring congestion on the parallel routes. The higher the congestion score, the more points to the project.
2. Safety Score (5%): A measure of the past crash history indicating whether the crashes on the parallel routes are greater than comparable routes elsewhere in the State. The higher the crash rates, the more points.

"Benefits" Factors
The current highway prioritization model does not account for the "benefits" factors of how projects meet identified deficiencies because the data is not readily available for all TIP projects. A review of various other State's highway prioritization models generated a list of factors that are believed to be applicable to North Carolina for prioritization. Based on the comments received, the below "benefit" factors should more accurately reflect the benefits of the urban loop projects. Again, once these criteria are finalized, the Department will provide MPO staff with the data inputs prior to finalizing the scoring. Also, these "benefits" factors below are more fully explained in the Appendix.

1. Travel time savings (30%). This is the key measure of whether the urban loop will reduce congestion and provide greater mobility. The benefits are based on travel time savings the loop project would provide to the region. The travel time savings will be calculated using the travel demand model for the area. The measure will be the reduction in vehicle hours of delay for the network. This will be determined by running the travel demand models with and without the loop projects. The higher the travel time savings using vehicle hours of delay by the users, the more points.
2. Economic Development (20%). A measure of the economic impact the project brings to the region. The NC Department of Commerce would provide this information. Department of Commerce has developed a dynamic economic analysis model which provides the economic impacts to the surrounding region. The model focuses on employment impacts created by the construction and the dynamic measure of economic development impacts on existing business. See the Appendix for further details on this model. This model and its inputs and outputs are not yet fully developed. However, it is clear that the model has the ability to forecast the employment and economic impacts as outlined and the greater the impacts, the more points will be assigned to the project.
3. Freight (5%). Domestic movement of freight will increase dramatically and the urban loops can assist in diverting truck traffic from central business districts, thus increasing mobility and safety and delaying pavement deterioration. The higher the truck volumes in the design year, the higher the points. Several comments were received on whether the type of truck traffic or the type of routes from which the truck traffic will be pulled to the

urban loop are part of this factor. Current data is not sophisticated enough to determine the type of truck traffic that will use the new urban loop. For the sake of simplicity, the Department will continue to use the truck volumes in the design year.

4. Multi-Modal (5%). A measure of the Department's commitment to promoting multi-modal options which boosts the ability to move people and goods more efficiently on the transportation network. Multi-modal is limited to whether the project provides for HOV/HOT/Light rail, etc. in the right of way or the project provides a direct connection to one or more other modal terminals. Multi-modal projects receive additional points.

5.Protected Right of Way (5%). This is a new criterion which essentially replaces the previous "land use" criteria. The reason for revising this criterion is that protection of right of way is a more accurate measure of a benefit to constructing the project. If right of way is protected or already partially or fully purchased, the project should receive more points. Keeping in mind that the urban loop program has been underway since 1989, this is a factor that may not be a perfect "benefit" factor but it is a significant enough factor to use it to rank projects**.**

6. Non-Loop Funding(20%). This is a new criterion and is being proposed based on comments received and a desire by the Department to move projects to construction where the use of loop funds can be eliminated or reduced. Briefly, this criterion will give points to projects where non-loop funds will supplant loop funds to cover right of way and construction costs. Examples would be tolling, innovative financing, TIFIA, GARVEE or a commitment by the MPO to use non-loop equity funds. The number of points awarded would be the percent of non-loop funds used to fully fund remaining right of way and construction. The greater that percentage of total costs, the more points. A caveat or restriction to this criterion is that the Department must be vigilant of the General Statute limitations as outlined elsewhere in this report.

Scoring System For Loop Projects: Each project would have a Priority Ratio. The highest Priority Ratio project would be the highest ranked project, the next highest priority ratio project would be the next highest rank project, etc. The Priority Ratio would consist of the numerator being the sum of the points from each "needs" factor multiplied by the weighted percentages plus the points from the "benefits" factors multiplied by the weighted percentages. . The denominator of the Priority Ratio would be the project costs to complete the project using loop funds. This amount includes the preliminary engineering, right-of-way and construction phases of work. It does not include operational or maintenance costs since loop funds are not used for those purposes. The higher the priority ratio, the higher the rank. The details of this scoring system are shown in the Appendix.

Other Considerations:

It is important to remember the remaining TIP Loop projects are already in various stages of planning or project development. Once the rankings are determined, there will still need to be a check on the status of each loop project to help determine the most cost-effective method of scheduling these ranked loop projects. For example, there are other factors that could be considered such as: avoiding lapse of planning documents or permits; status of environmental document; whether the project must be constructed to meet an air quality conformity determination and if so, what year must it be completed;

building usable segments; whether the project has an added benefit of serving strategic military locations, homeland security, national defense and FEMA staging areas; applying funds to areas based on construction costs, inflation, volumes of work and capacity of the industry. No additional scoring is contemplated for these factors but they should be a part of the decision on when to schedule projects for funding.

DETAILED SCORING MATRIX ***APP*****PENDIX**

As stated previously, each of the following needs factors and benefit factors may receive a possible 100 points. Then, each factor will be given a percentage weight in relation to the other factors and the total weights must equal 100%. The number in parenthesis below is the weighted percentage of the total score. For example, the points for congestion will range from 0 to 100. That point total will be multiplied by 20% to determine the number of points to be added to the other factors to determine the total points awarded to the project.

"Needs" Factors:
General Theme on "Needs": The higher the deficiencies, the more points.
This data resides in the Department's databases. The data is the most current Volume to capacity and AADT data available – currently this data is 2008 data or newer. The "needs" factor data is derived from the existing parallel routes that carry traffic now that would be expected to travel the new urban loop project. The Department will work with MPO staff to reach agreement on these parallel routes. It is recognized that different segments of routes will have different individual scores. The plan will be to determine one score based on a weighted average according to segment length of the parallel routes.

1. Congestion score (10% of total score): The congestion score is a combination of Volume/Capacity (V/C) ratio and Average Daily Traffic (ADT). Sixty percent of this score is the volume/capacity ratio and 40% is AADT. Current NCDOT data will be used. The total number of possible points for this score is 100. The calculated congestion score will be between 0-100 and this number will be the points assigned to this criterion. For example, a congestion score of 65 will result in 65 points to this criterion.

2. Safety score (5% of total score): This is a combination of three equally weighted safety-related factors: Crash Density (The crash density of the study area versus the average crash density of similar facilities) plus Severity Index (measure of the mix of accident severity in a group of accidents at a location) plus Critical Crash Rate (the actual crash rate versus the critical crash rate for the study area). Each of these factors is decimal so the combined score will be a decimal. This decimal score will range from 0 to 1. Use the current "3-year moving average" data from parallel routes. Multiply the decimal score by 100 to determine the total number of possible points.

"Benefits" Factors
General Theme on" Benefit-Cost": The greater the benefits, the more points.

Similar to the "Needs" factore, each of the following "benefits" factors may receive a possible 100 points. Then, each factor will be given a percentage weight in relation to the other factors and the total weights must equal 100%. The below criteria are now proposed based on comments received.

1. Travel Time savings (30% of total score). This is a key measure of whether an urban loop is reducing congestion and thus improving mobility. The greater the travel time savings, the better for mobility, the greater the points. The Department's Transportation Planning Branch (TPB) and various Metropolitan Planning Organizations (MPOs) travel demand models have data which can provide travel time savings for urban loop projects, i.e. time savings in the area with and without the loop project. The greater the travel time savings, the more points. These travel time savings will be expressed in vehicle hours of delay by the users of the network. To date, these models have not yet been run to determine vehicle hours of delay, thus it is not known exactly the magnitude of these vehicle hours of delay. What is proposed for scoring is a system of giving points to projects based on comparative ranking of one loop project versus other loop projects. In other words, if Project A has the greatest number of hours of reduction in vehicle hours of delay in comparison to other projects, that project receives the most number of points. The projects will be listed using the number of vehicle hours of delay being reduced as the criteria from greatest to least number of hours of delay. If there are 25 projects, then the project with the greatest hours of reduction in vehicle hours of delay will get 100 points. The second project gets 96 points, etc.

2, Economic Development (20% of total score). This is a measure of the economic impact the project brings to the region. The Department of Commerce has developed a dynamic economic analysis model which provides the economic impacts to the surrounding region. The model focuses on employment impacts created by the construction and the dynamic measure of economic development impacts on existing business. The construction impacts include direct, indirect and induced employment create by the investment of the project. Direct effects used here would be the employment opportunities that an initial investment would have upon the region. Indirect effects are employment opportunities that regional suppliers and others will experience due to the initial project investment. Induced effects are employment opportunities due to the change in household purchasing due to change in compensation in the region.

The dynamic measure of impacts on existing businesses examines the high growth/targeted industries and manufacturing industries within a 1 mile buffer of the proposed loop. In addition the number of jobs in the buffer, the population in the county(s) within the project and the effect of tourism brought by the loop are analyzed to determine the additional expected employment impacts of constructing the loop.

The outputs of the model are expressed in terms of employment created. Since the model has not yet been fully developed, it is not yet possible to develop some table of what may be the expected range of the output measure. Therefore, it is proposed that the scoring system consist of giving points to projects based on comparative ranking of one loop project versus other loop projects. In other words, if Project A has the greatest number

of employment opportunities in comparison to other projects, that project receives the most number of points. The maximum number of points, like all the other factors, is 100. The projects will be listed using the number of employment opportunities created as the criteria from greatest to least. If there are 25 projects, then the project with the greatest employment opportunities will get 100 points. The second project gets 96 points, etc. If there are only 20 projects being evaluated, then the project with the greatest employment opportunities would still get 100 points but the second project would get 95 points, etc.

The Department staff will work with MPO staff to allow MPO review of input data to the dynamic model prior to running the model..

3. Freight (5% of total score). The State is expected to experience a 67% increase in domestic freight tonnage over the next 20 years (21st Century Report, 2008)- an explosive growth rate. The Department needs to accommodate the increase. Urban loop projects provide the opportunity to divert through truck traffic from central business district areas, thus increasing safety, reducing congestion and helping extend the pavement life. Projects that carry high truck volumes receive more points. Use projected 20-year forecasted traffic. If 20-year AADT truck volumes >1000 = 10 point. If truck volumes >10,000 = 100 points and similarly in-between. See Table:
Truck volume > 1,000 = 10 point
Truck volume>2,000 = 20points
Continue volume to number ratio up to 10,000 and points assigned
Truck volume >10,000 = 100 points (max)

4. Multi-Modal (5% of total score).
This factor is used in the Department's overall strategic prioritization process. The Department is committed to multi-modal projects. This is also a measure of the Department's commitment to promoting multi-modal options which boosts the ability to move people and goods more efficiently on the transportation network The definition of "multi-modal" is a project which encourages the use of 2 or more modes (highway, bicycling, walking, rail, ferry, aviation, transit) to achieve enhanced mobility in a travel corridor." Loop Projects must meet the definition of "multi-modal" and then will receive points based on the following scoring:
1. HOV/HOT or Light Rail or Bus Rapid Transit within the highway right-of-way = 60 points.
2. Connection to one other transportation terminals (airport, seaport, rail depot, ferry terminal, inter-modal terminal, transit terminal) = 30 points. A connection to two or more transportation terminals receives an additional 10 points. Connections to other transportation terminals are defined as a Loop Project providing access within one mile of the terminal right-of-way. One mile is chosen as a reasonable distance to whether the new loop truly would provide ready access to the terminal.

5.Protected Right of Way (5% of total score). This is a new criterion which essentially replaces the previous "land use" criteria. The reason for revising this criterion is that protection of right of way is a more accurate measure of a benefit to constructing the project. If right of way is protected or already partially or fully purchased, the project should receive more points. Keeping in mind that the urban loop program has been

underway since 1989, this is a factor that may not be a perfect "benefit" factor but it is a significant enough factor to use it to rank projects.
Again, the maximum number of points for this factor is 100. Where the corridor has been protected but no right of way purchased, the project is assigned 50 points. Where right of way has been partially acquired, the project is assigned 75 points. Where the right of way has been fully purchased or funds already authorized to fully fund right of way, then 100 points would be assigned to the project. Where there has been no corridor protected and no right of way purchased, no points would be assigned.

6. Non-Loop Funding (20% or total score). This is a new criterion and is being proposed based on comments received as well as a desire by the Department to move projects to construction where the use of loop funds can be eliminated or reduced. Briefly, this criterion will give points to projects where non-loop funds will supplant loop funds to cover right of way and construction costs. Examples would be tolling, innovative financing, TIFIA, GARVEE or a commitment by the MPO to use non-loop equity funds. The number of points awarded would be the percent of non-loop funds used to fully fund remaining right of way and construction costs. The greater that percentage of total costs being borne by non-loop funds, the more points. A caveat or restriction to this criterion is that the Department must be vigilant of the General Statute limitations. G.S.136-66 and G.S.143B-350 place restrictions on giving an advantage to any project using local government participation. See below for statute language.

G.S.136-66.3 c(1) states: No TIP Disadvantage for Participation. – If a county or municipality participates in a State highway system improvement project, as authorized by this section, or by G.S. 136-51 and G.S. 136-98, the Department shall ensure that the local government's participation does not cause any disadvantage to any other project in the Transportation Improvement Program under G.S. 143B-350(f)(4).

GS.143B-350 states: Local Government Participation. – The ability of a local government to pay in part or whole for any transportation improvement project shall not be a factor considered by the Board of Transportation in its development and approval of a schedule of major State highway system improvement projects to be undertaken by the Department under G.S. 143B-350(f)(4).

Thus, the Department is proposing a criterion that should help meet the desires of the comments and Department stays within the context of the General Statues. Points will be assigned based on the percentage of non-loop funds committed to fund the combined expected right of way and construction costs. In other words, if non-loop funding will cover 100 percent of the expected right-of-way and construction costs, then the project will be assigned 100 points for this factor. If non-loop funding will cover only 50 percent of the total right of way and construction costs, then only 50 points will be assigned. Again, any funding contributions by local governments/municipalities can not be used to determine the points given the limitations of the existing statutes.

SUMMARY TABLE OF POINTS

"Needs" Factors	**Percentage of Total Score**
1.Congestion	10
2.Safety	5
"Benefits" Factors:	
1. Travel Time savings	30
2. Economic Development	20
3,.Freight	5
4. Multi-Modal	5
5. Protected Right of Way	5
6. Non-Loop Funding	20

Priority Ratio = $\dfrac{\text{Needs factor points plus Benefits factor points}}{\text{Project Costs (Capital Expenditures)}}$

Priority Ratio: "Needs" factor points plus "Benefits" factor points in the numerator. Project Costs (representing remaining preliminary engineering, right-of-way and construction) in the denominator.

A Priority Ratio which is a benefit-cost type ratio can be computed. The numerator in the ratio would be the simple addition of "needs" plus "benefits" factors. The denominator would be the sum of the expected project costs for remaining preliminary engineering, right-of-way and construction. These costs would not include operations and maintenance costs that one could expect to see in a traditional benefit-cost methodology because loop funds are only used for the capital expenditure. These project costs would typically be in the millions of dollars which would result in a ratio having multiple decimal places. The total project costs, therefore, should be shown in "millions" of dollars in order to make the final "priority ratio" a more easily understood number. The higher the priority ratio, the higher the rank.